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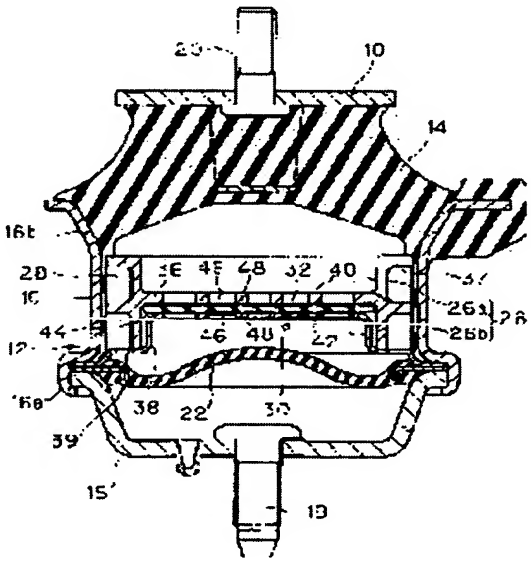
(54) FLUID FILLING-IN VIBRATION-RESISTANT DEVICE

(57)Abstract:
PROBLEM TO BE SOLVED: To provide a vibration-resistant device preventing a filled liquid from unnecessarily leaking out between through-holes of a partitioning member and improving vibration-resistant performance.
SOLUTION: The vibration-resistant device is provided with a first installing member 10 and a second installing member 12 which are combined each other via a vibration-resistant base body 14 formed by a rubber material, a fluid filling-in chamber 26 arranged between a diaphragm 22 mounted on the installing member 12 and the vibration-resistant base body 14 which is partitioned into two chambers by a partitioning member 30, and two chambers 26a and 26b connected each other by an orifice 28. The partitioning member 30 comprises an elastic film 32 partitioning two chambers 26a and 26b, and a pair of lattices 40 and 42 restricting displacement of the elastic film 32. A projected ridge 48 surrounding the whole through-holes 46 at the whole periphery is integrally arranged on the surface of the elastic film 32. A movement of fluid between adjacent through-holes is controlled by making the projected ridge 48 connected with the lattices 40 and 42.



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CLAIMS

[Claim(s)]
[Claim 1] The vibrationproofing base which consists of the 1st attachment member, the 2nd attachment member, and rubber material that is interposed between these attachment members and combines both the attachment member, The diaphram which was made to counter said vibrationproofing base and was attached in said 2nd attachment member, The fluid enclosure room prepared between the aforementioned vibrationproofing base and diaphram, and the batch member which divides said fluid enclosure room into the 1st room by the side of a vibrationproofing base, and the 2nd room by the side of diaphram, The elastic membrane into which is equipped with the orifice which makes the 1st aforementioned room and the 2nd room open for free passage, and said batch member divides the 1st aforementioned room and the 2nd room, Come to have the grid of the pair which restricts the variation rate of this elastic membrane, and between the front face of said elastic membrane, and the field of said grid which counters this The fluid filled system vibration isolator characterized by preparing the protruding line which regulates migration of the fluid between the through tubes which enclose each through tube formed of this grid over the perimeter, and adjoin.
[Claim 2] The fluid filled system vibration isolator according to claim 1 characterized by preparing said protruding line in the field of said grid which counters the front face of said elastic membrane, or this at one.
[Claim 3] Said grid consists of two or more annular sections prolonged in a hoop direction, and the connection section which is prolonged in radial and connects said two or more annular sections, and two or more trains of through tube trains which come to arrange two or more through tubes to a hoop direction in this grid are established. Here Two or more annular heights which said connection section is allotted in a pitch which is different by the inner circumference [of said grid], and periphery side, and said protruding line is prepared in said elastic membrane, and are prolonged in a hoop direction corresponding to said annular section of said grid, It is the fluid filled system vibration isolator according to claim 1 or 2 which consists of two or more radial heights prolonged in a radial corresponding to said connection section of said grid, and is characterized by having prolonged said radial heights in the radial at the equal include angle covering the radial abbreviation overall length of said elastic membrane.
[Claim 4] The fluid filled system vibration isolator according to claim 3 characterized by positioning said elastic membrane in a hand of cut by establishing the crevice for positioning into which these heights fit in said grid, and carrying out fitting of both to it while preparing the heights for positioning in said elastic membrane.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention] This invention relates to the fluid filled system vibration isolator used for mainly supporting oscillating objects, such as an automobile engine, in vibrationproofing.
[0002]
[Description of the Prior Art] The 1st fixing metal with which a fluid filled system vibration isolator is generally attached in an oscillating generating object side, such as an engine, The 2nd tubed fixing metal by which attachment immobilization is carried out at the support side of a car-body frame etc. Join together through the vibrationproofing base which consists of rubber material, and counter with a vibrationproofing base and diaphram is allotted to the lower part side of the 2nd fixing metal of the above. Make a room into a fluid enclosure room among between a vibrationproofing base and diaphram, and this fluid enclosure room is divided into two by the side of a vibrationproofing base and diaphram by the batch member. It is constituted so that it may make it come to be open for free passage of both ** with an orifice and a periodic-damping function may be achieved according to the liquid convection effect between both the liquid rooms by the orifice, or the vibration-deadening effectiveness of a vibrationproofing base.
[0003] In this fluid filled system vibration isolator, what was constituted from elastic membrane as valve portion material which carries out reciprocation displacement of the batch member, and a grid of the vertical pair which restricts a motion of this elastic membrane is well-known. Under vibration of the large amplitude with a low frequency like vibration resulting from the irregularity of the road surface at the time of car transit, the vibration isolator with such elastic membrane demonstrates a periodic-damping function because a fluid flows for two rooms through an orifice. On the other hand, under vibration of tiny vibration width of face with a high frequency like vibration resulting from an engine rotational frequency, the above-mentioned orifice does not function but demonstrates a periodic-damping function according to reciprocation deformation of elastic membrane.
[0004] What was constituted from a grid of a vertical pair and elastic membrane held between these grids in the French patent public presentation No. 2674590 official report as a batch member into which an up-and-down liquid room is divided is indicated. In this official report, in order to pinch the center section between up-and-down grids, to prepare elastic membrane so that a edge may float, and to prevent generating of the collision sound of elastic membrane and a grid, or the noise which is not desirable, the circular projection which counters a grid is prepared in one [at least] field of elastic membrane. This circular projection is equally arranged in the condition of having stood in a line in the shape of a ring on the surface of elastic membrane, and has the function which is gradually pressed by the grid and subsequently loosens elastically at the time of actuation of elastic membrane.
[0005] Moreover, although it is sequential in [not elastic membrane but a grid] include angle in order to prevent like the above generating of the collision sound of elastic membrane and a grid, or the noise which is not desirable to JP,6-221368,A, the technique of preparing the rib of the inhomogeneity which does not have a repeat in include angle over the whole surroundings of an axis is indicated.
[0006]
[Problem(s) to be Solved by the Invention] A circular projection and rib of the above-mentioned conventional technique are prepared in order to mitigate the impulsive sound at the time of colliding with a grid because elastic membrane displaces up and down, and they do not restrict migration of a hoop direction or radial mounting fluid between the through tubes formed of a grid. Therefore, in the above-mentioned conventional vibration isolator, migration (leak) of mounting fluid takes place between the through tubes which adjoin under vibration of the large amplitude with a low frequency, and it is hard to demonstrate the higher engine performance.
[0007] This invention is made in view of such a point, prevents unnecessary leak of the enclosure fluid between the through tubes of a batch member, and aims at improving vibration-proof ability.
[0008]
[Means for Solving the Problem] The fluid filled system vibration isolator of this invention The 1st attachment member and the 2nd attachment member, The vibrationproofing base which consists of rubber material which is interposed between these attachment members and combines both the attachment member, The diaphram which was made to counter said vibrationproofing base and was attached in said 2nd attachment member, The fluid enclosure room prepared between the aforementioned vibrationproofing base and diaphram, and the batch member which divides said fluid enclosure room into the 1st room by the side of a vibrationproofing base, and the 2nd room by the side of diaphram, The elastic membrane into which is equipped with the orifice which makes the 1st aforementioned room and the 2nd room open for free passage, and said batch member divides the 1st aforementioned room and the 2nd room, It comes to have the grid of the pair which restricts the variation rate of this elastic membrane, and the protruding line which regulates migration of the fluid between the through tubes which enclose each through tube formed of this grid over the perimeter between the front face of said elastic membrane and the field of said grid which counters this, and adjoin it is prepared.
[0009] In the fluid filled system vibration isolator of this invention, the leakage of the fluid between the through tubes by which the above-mentioned protruding line adjoins under vibration of the large amplitude especially with a low frequency is prevented by having prepared the protruding line which encloses each through tube over elastic membrane and the grid which counters this in the perimeter. Therefore, elastic membrane can be sagged for every through tube, and a high loss factor is acquired. Moreover, under vibration of tiny vibration width of face with a high frequency, you may make it a fluid move exceeding the above-mentioned protruding line, the fluid which moves in that case exceeding a protruding line eases a fluid pressure difference, and a low dynamic spring constant is demonstrated.
[0010] The above-mentioned protruding line can be prepared in the field of the grid which counters the front face of elastic membrane, or this at one.
[0011] It consists of two or more annular sections to which said grid extends in a hoop direction, and the connection section which is prolonged in radial and connects said two or more annular sections, and two or more trains of through tube trains which come to arrange two or more through tubes to a hoop direction in this grid are more specifically established. Here Two or more annular heights which said connection section is allotted in a pitch which is different by the inner circumference [of said grid], and periphery side, and said protruding line is prepared in said elastic membrane, and are prolonged in a hoop direction corresponding to said annular section of said grid, It may

consist of two or more radial heights prolonged in a radial corresponding to said connection section of said grid, and said radial heights may be prolonged in the radial at the equal include a[illegible]overing the radial abbreviation overall length of said[illegible]tic membrane. In this case, although there are some radial heights which do not a[illegible]r on the connection section of a grid, even if it is th[illegible]ruding line from which it separated from the grid in this way, bending behavior for every through tube of elastic membrane is not barred. Therefore, the protruding line equally arranged by the circumference of the axis of elastic membrane does not give trouble to a function, either.

[0012] When preparing the above-mentioned protruding line in elastic membrane, while preparing the heights for positioning in elastic membrane, said elastic membrane may be positioned in a hand of cut by establishing the crevice for positioning into which these heights fit in said grid, and carrying out fitting of both to it. Thereby, the radial heights prepared in elastic membrane can be certainly carried on the connection section of a grid.

[0013]

[Embodiment of the Invention] Hereafter, the operation gestalt of this invention is explained with reference to a drawing.

[0014] Drawing of longitudinal section of the fluid filled system vibration isolator which drawing 1 requires for 1 operation gestalt of this invention, and drawing 2 are the exploded view. This vibration isolator comes to join together the 1st fixing metal 10 attached in an oscillating generating object side, such as an engine, and the 2nd tubed fixing metal 12 by which attachment immobilization is carried out at the support side of a car-body frame etc. through the vibrationproofing base 14 which consists of rubber material.

[0015] The 2nd fixing metal 12 consists of tubed metallic ornaments 16 and bottom metallic ornaments 18 concluded by the lower limit 16a with the caulking means, and the bolt 19 for attachment protrudes on the bottom metallic ornaments 18.

[0016] The 1st fixing metal 10 is the plate-like part material which set necessary spacing to the axial center section upper part of the 2nd fixing metal 12, and was allotted to it, and the bolt 20 for attachment protrudes on the center section towards the upper part.

[0017] The 1st fixing metal 10 fixed [the appearance] the abbreviation truncated cone form with the vulcanization shaping means on nothing and its top face, and the upper limit section of the 2nd fixing metal 12 has fixed the vibrationproofing base 14 with the vulcanization shaping means in the lower limit periphery section. In the case of drawing, diameter expansion formation of the upper limit section 16b of the tubed metallic ornaments 16 is carried out at the shape of a taper, and vulcanization adhesion of the lower periphery of the vibrationproofing base 14 is carried out at this upper limit section 16b. Thin film rubber section 14a installed in the shape of a thin film from the vibrationproofing base 14 is prepared in the internal surface of the 2nd fixing metal 12.

[0018] The lower part side of the 2nd fixing metal 12 is equipped with the diaphram 22 which consists of rubber membrane so that it may counter with the vibrationproofing base 14. Diaphram 22 equips the periphery section with the ring-like reinforcement metallic ornaments 24, and it is attached in the 2nd fixing metal 12 by these reinforcement metallic ornaments 24 making it go away with the tubed metallic ornaments 16 and the bottom metallic ornaments 18, and caulking immobilization being carried out at the section.

[0019] Inside the 2nd fixing metal 12, the fluid enclosure room 26 sealed between diaphram 22 and the vibrationproofing base 14 is formed, and the liquid as a fluid is enclosed with this fluid enclosure room 26. the disc-like batch member 30 which has an orifice 28 at a periphery in the inner circumference of the 2nd fixing metal 12 in the fluid enclosure room 26 -- liquid -- it is attached densely. The fluid enclosure room 26 is divided into 1st room 26a by the side of a vibrationproofing base, and 2nd room 26b by the side of diaphram by this batch member 30, and both ** 26a and 26b are made open for free passage by the orifice 28.

[0020] The batch member 30 consists of disc-like rubber membrane 32 as valve portion material which divides 1st room 26a and 2nd room 26b, an orifice member 36 equipped with the slot 34 for forming an orifice 28 in a periphery, and a dashboard 38 that presses the periphery edge of the orifice member 36 to the vibrationproofing base 14 side.

[0021] The orifice member 36 is a metal or the mold Plastic solid of resin, and the slot 34 which extends over 2 rounds of upper and lower sides in a hoop direction is formed in the peripheral face. Let space surrounded by this slot 34 and thin film rubber section 14a of the vibrationproofing base 14 be an orifice 28.

[0022] A dashboard 38 is the press-forming object of a metal plate, and is equipped with disc-like central shelf 38a projected up. The dashboard 38 is attached in the 2nd fixing metal 12 by periphery edge 38b making it go away with the tubed metallic ornaments 16 and the bottom metallic ornaments 18, and caulking immobilization being carried out at the section.

[0023] The openings 37 and 39 for making 1st room 26a and 2nd room 26b open an orifice 28 for free passage are formed in the orifice member 36 and the dashboard 38, respectively.

[0024] The grids 40 and 42 with the circular appearance which restricts the variation rate of the vertical direction of rubber membrane 32 to a center section are formed at the orifice member 36 and the dashboard 38, respectively. Rubber membrane 32 is allotted in the clearance (hold space) 44 formed between the grid 40 of the orifice member 36 which faced 1st room 26a, and the grid 42 of the dashboard 38 facing 2nd room 26b, and the variation rate is restricted between both the grids 40 and 42. the dimension (height) of a clearance 44 is greatly set up a little rather than the thickness of rubber membrane 32 -- having -- **** -- thereby -- vertical movement of rubber membrane 32 -- the variation rate is made possible.

[0025] Both the grids 40 and 42 have the same grid configuration. As shown in drawing 4 , the grid 42 prepared in central shelf 38a of a dashboard 38 consists of connection section 42b which connects between three concentric annular sections 42a prolonged in a hoop direction, and the two annular sections which prolong and adjoin radial. Connection section 42b is allotted in a pitch which is different by the inner circumference [of a grid 42], and periphery side, in the case of drawing, connection section 42b by the side of inner circumference is prepared at intervals of 90 degrees, and eight connection section 42b by the side of 4 and a periphery is prepared at intervals of 45 degrees. Moreover, both shift 22.5 degrees of phases and are prepared so that all of connection section 42b by the side of inner circumference and connection section 42b by the side of a periphery may not be in agreement. Although the through tube train which comes to arrange the through tube 46 of the shape of two or more slot is prepared in a hoop direction in this grid 42 at two trains by the side of inner circumference and a periphery, as for a through tube 46, eight pieces are prepared by the four-piece and periphery side by the inner circumference side by having changed the pitch of connection section 42b as mentioned above. Thus, by lessening the number of through tubes 46 by the inner circumference side, the opening area of each through tube 46 by the side of inner circumference is greatly securable to the same extent a periphery side. It is the same configuration as the grid 42 of the dashboard 38 which also described above the grid 40 of the orifice member 36, and both 36 and 38 are attached so that it may be allotted to the location whose mutual through tube 46 corresponded.

[0026] The protruding line 48 which encloses the periphery of each through tube 46 over the perimeter in contact with the field where the above-mentioned grids 40 and 42 counter is projected and formed in the front face of rubber membrane 32 at one. The protruding line 48 is formed in vertical both sides of rubber membrane 32 in the same configuration, as shown in drawing 3 . As shown in drawing 4 , specifically, a protruding line 48 consists of radial heights 48b prolonged in a radial corresponding to three connection sections of concentric annular heights 48a and grid 42 extend in hoop direction corresponding to annular section 42a of grid 42 42b. This radial heights 48b is prolonged covering the radial abbreviation overall length from the core of rubber membrane 32. Moreover, radial heights 48b is prepared at intervals of 22.5 degrees as appeared in all connection section 42b of a grid 42 in at least one, and so that a radial may be prolonged at an equal include angle.

[0027] As mentioned above, when a fluid flows between two-room 26a and 26b through an orifice 28 under vibration of the large amplitude with a low frequency (for example, **0.3mm or more) as it is the vibration isolator of this becoming operation gestalt, a periodic-damping function is demonstrated. Moreover, the leakage of the fluid between the through tubes 46 which adjoin a hoop direction or radial is prevented

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by contacting the bearing side of grids 40 and 42 where the protruding line 48 prepared in rubber membrane 32 faces. Therefore, rubber membrane 32 can be sagged every through [redacted]6, and a high loss factor is acquired. On the other h[redacted]under vibration of tiny vibration width of face with a high frequency (for exam[redacted]**0.1mm or less), the above-mentioned orifice 28 d[redacted]t function, but the fluid pressure difference of 1st room 26a and 2nd room 26b is eased with the fluid which moves exceeding a protruding line 48, and a low dynamic spring constant is demonstrated. Thus, a high loss factor and a low dynamic spring constant can be attained abolishing an amplitude dependency as it is the vibration isolator of this operation gestalt, and sufficient engine performance can be demonstrated under different amplitude.

[0028] In addition, by radial heights 48b equally arranged in the circumference of an axis, what does not appear on the connection section of grids 40 and 42 exists by having changed the arrangement pitch of the connection section of grids 40 and 42 by the inner circumference and periphery side. However, bearing is not given to the above-mentioned engine performance in order not to bar the bending behavior for every through tube 46 of rubber membrane 32, even if it is the protruding line 48 from which it separated from grids 40 and 42 in this way.

[0029] Drawing 5 shows the example which added the configuration for positioning in the hand of cut of rubber membrane 32 to the above-mentioned operation gestalt. That is, rubber membrane 32 is equipped with the elliptical heights 50 for positioning which projects in a dashboard 38 side in this example. These heights 50 are formed in the center section of rubber membrane 32. Moreover, a dashboard 38 is equipped with the crevice 52 for positioning where the above-mentioned heights 50 fit into the core of central shelf 38a. This crevice 52 consists of a long hole corresponding to the appearance configuration of heights 50 with this operation gestalt.

[0030] In this case, radial heights 48b prepared in rubber membrane 32 can be certainly carried on connection section 42b of a grid 42 by carrying rubber membrane 32 on the grid 42 of a dashboard 38, making the crevice 52 of a dashboard 38 carry out fitting of the heights 50 of rubber membrane 32, in case rubber membrane 32 is attached on a dashboard 38.

[0031] In addition, the configuration of heights 50 and a crevice 52 is not limited to the ellipse form described above when positioning in a hand of cut was possible, but various configurations, such as the shape of a polygon, can be used for it. Moreover, the heights for positioning and every two crevices may be prepared, and you may position by 2 sets of fitting.

[0032] With the above operation gestalt, although the protruding line 48 was formed in rubber membrane 32, a protruding line may be prepared in grids 40 and 42 at one. In this case, the leakage of the fluid between the through tubes 46 which adjoin because the protruding line prepared in grids 40 and 42 contacts rubber membrane 32 is prevented.

[0033]

[Effect of the Invention] By having prepared the protruding line which encloses each through tube over the grid which counters elastic membrane and this as it is the fluid filled system vibration isolator of this invention in the perimeter, the leakage of the fluid between the through tubes which adjoin under vibration of the large amplitude especially with a low frequency is prevented, the thing of it can be carried out, and vibration-proof ability can be improved.

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TECHNICAL FIELD

[Field of the Invention] This invention relates to the fluid filled system vibration isolator used for mainly supporting oscillating objects, such as an automobile engine, in vibrationproofing.

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PRIOR ART

[Description of the Prior Art] The 1st fixing metal with which a fluid filled system vibration isolator is generally attached in an oscillating generating object side, such as an engine, The 2nd tubed fixing metal by which attachment immobilization is carried out at the support side of a car-body frame etc. Join together through the vibrationproofing base which consists of rubber material, and counter with a vibrationproofing base and diaphram is allotted to the lower part side of the 2nd fixing metal of the above. Make a room into a fluid enclosure room among between a vibrationproofing base and diaphram, and this fluid enclosure room is divided into two by the side of a vibrationproofing base and diaphram by the batch member. It is constituted so that it may make it come to be open for free passage of both ** with an orifice and a periodic-damping function may be achieved according to the liquid convection effect between both the liquid rooms by the orifice, or the vibration-deadening effectiveness of a vibrationproofing base.

[0003] In this fluid filled system vibration isolator, what was constituted from elastic membrane as valve portion material which carries out reciprocation displacement of the batch member, and a grid of the vertical pair which restricts a motion of this elastic membrane is well-known. Under vibration of the large amplitude with a low frequency like vibration resulting from the irregularity of the road surface at the time of car transit, the vibration isolator with such elastic membrane demonstrates a periodic-damping function because a fluid flows for two rooms through an orifice. On the other hand, under vibration of tiny vibration width of face with a high frequency like vibration resulting from an engine rotational frequency, the above-mentioned orifice does not function but demonstrates a periodic-damping function according to reciprocation deformation of elastic membrane.

[0004] What was constituted from a grid of a vertical pair and elastic membrane held between these grids in the French patent public presentation No. 2674590 official report as a batch member into which an up-and-down liquid room is divided is indicated. In this official report, in order to pinch the center section between up-and-down grids, to prepare elastic membrane so that a edge may float, and to prevent generating of the collision sound of elastic membrane and a grid, or the noise which is not desirable, the circular projection which counters a grid is prepared in one [at least] field of elastic membrane. This circular projection is equally arranged in the condition of having stood in a line in the shape of a ring on the surface of elastic membrane, and has the function which is gradually pressed by the grid and subsequently loosens elastically at the time of actuation of elastic membrane.

[0005] Moreover, although it is sequential in [not elastic membrane but a grid] include angle in order to prevent like the above generating of the collision sound of elastic membrane and a grid, or the noise which is not desirable to JP,6-221368,A, the technique of preparing the rib of the inhomogeneity which does not have a repeat in include angle over the whole surroundings of an axis is indicated.

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EFFECT OF THE INVENTION

[Effect of the Invention] By having prepared the protruding line which encloses each through tube over the grid which counters elastic membrane and this as it is the fluid filled system vibration isolator of this invention in the perimeter, the leakage of the fluid between the through tubes which adjoin under vibration of the large amplitude especially with a low frequency is prevented, the thing of it can be carried out, and vibration-proof ability can be improved.

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TECHNICAL PROBLEM

[Problem(s) to be Solved by the Invention] A circular projection and rib of the above-mentioned conventional technique are prepared in order to mitigate the impulsive sound at the time of colliding with a grid because elastic membrane displaces up and down, and they do not restrict migration of a hoop direction or radial mounting fluid between the through tubes formed of a grid. Therefore, in the above-mentioned conventional vibration isolator, migration (leak) of mounting fluid takes place between the through tubes which adjoin under vibration of the large amplitude with a low frequency, and it is hard to demonstrate the higher engine performance.
[0007] This invention is made in view of such a point, prevents unnecessary leak of the enclosure fluid between the through tubes of a batch member, and aims at improving vibration-proof ability.

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MEANS

[Means for Solving the Problem] The fluid filled system vibration isolator of this invention The 1st attachment member and the 2nd attachment member, The vibrationproofing base which consists of rubber material which is interposed between these attachment members and combines both the attachment member, The diaphram which was made to counter said vibrationproofing base and was attached in said 2nd attachment member, The fluid enclosure room prepared between the aforementioned vibrationproofing base and diaphram, and the batch member which divides said fluid enclosure room into the 1st room by the side of a vibrationproofing base, and the 2nd room by the side of diaphram, The elastic membrane into which is equipped with the orifice which makes the 1st aforementioned room and the 2nd room open for free passage, and said batch member divides the 1st aforementioned room and the 2nd room, It comes to have the grid of the pair which restricts the variation rate of this elastic membrane, and the protruding line which regulates migration of the fluid between the through tubes which enclose each through tube formed of this grid over the perimeter between the front face of said elastic membrane and the field of said grid which counters this, and adjoin it is prepared.

[0009] In the fluid filled system vibration isolator of this invention, the leakage of the fluid between the through tubes by which the above-mentioned protruding line adjoins under vibration of the large amplitude especially with a low frequency is prevented by having prepared the protruding line which encloses each through tube over elastic membrane and the grid which counters this in the perimeter. Therefore, elastic membrane can be sagged for every through tube, and a high loss factor is acquired. Moreover, under vibration of tiny vibration width of face with a high frequency, you may make it a fluid move exceeding the above-mentioned protruding line, the fluid which moves in that case exceeding a protruding line eases a fluid pressure difference, and a low dynamic spring constant is demonstrated.

[0010] The above-mentioned protruding line can be prepared in the field of the grid which counters the front face of elastic membrane, or this at one.

[0011] It consists of two or more annular sections to which said grid extends in a hoop direction, and the connection section which is prolonged in radial and connects said two or more annular sections, and two or more trains of through tube trains which come to arrange two or more through tubes to a hoop direction in this grid are more specifically established. Here Two or more annular heights which said connection section is allotted in a pitch which is different by the inner circumference [of said grid], and periphery side, and said protruding line is prepared in said elastic membrane, and are prolonged in a hoop direction corresponding to said annular section of said grid, It may consist of two or more radial heights prolonged in a radial corresponding to said connection section of said grid, and said radial heights may be prolonged in the radial at the equal include angle covering the radial abbreviation overall length of said elastic membrane. In this case, although there are some radial heights which do not appear on the connection section of a grid, even if it is the protruding line from which it separated from the grid in this way, bending behavior for every through tube of elastic membrane is not barred. Therefore, the protruding line equally arranged by the circumference of the axis of elastic membrane does not give trouble to a function, either.

[0012] When preparing the above-mentioned protruding line in elastic membrane, while preparing the heights for positioning in elastic membrane, said elastic membrane may be positioned in a hand of cut by establishing the crevice for positioning into which these heights fit in said grid, and carrying out fitting of both to it. Thereby, the radial heights prepared in elastic membrane can be certainly carried on the connection section of a grid.

[0013]

[Embodiment of the Invention] Hereafter, the operation gestalt of this invention is explained with reference to a drawing.

[0014] Drawing of longitudinal section of the fluid filled system vibration isolator which drawing 1 requires for 1 operation gestalt of this invention, and drawing 2 are the exploded view. This vibration isolator comes to join together the 1st fixing metal 10 attached in an oscillating generating object side, such as an engine, and the 2nd tubed fixing metal 12 by which attachment immobilization is carried out at the support side of a car-body frame etc. through the vibrationproofing base 14 which consists of rubber material.

[0015] The 2nd fixing metal 12 consists of tubed metallic ornaments 16 and bottom metallic ornaments 18 concluded by the lower limit 16a with the caulking means, and the bolt 19 for attachment protrudes on the bottom metallic ornaments 18.

[0016] The 1st fixing metal 10 is the plate-like part material which set necessary spacing to the axial center section upper part of the 2nd fixing metal 12, and was allotted to it, and the bolt 20 for attachment protrudes on the center section towards the upper part.

[0017] The 1st fixing metal 10 fixed [the appearance] the abbreviation truncated cone form with the vulcanization shaping means on nothing and its top face, and the upper limit section of the 2nd fixing metal 12 has fixed the vibrationproofing base 14 with the vulcanization shaping means in the lower limit periphery section. In the case of drawing, diameter expansion formation of the upper limit section 16b of the tubed metallic ornaments 16 is carried out at the shape of a taper, and vulcanization adhesion of the lower periphery of the vibrationproofing base 14 is carried out at this upper limit section 16b. Thin film rubber section 14a installed in the shape of a thin film from the vibrationproofing base 14 is prepared in the internal surface of the 2nd fixing metal 12.

[0018] The lower part side of the 2nd fixing metal 12 is equipped with the diaphram 22 which consists of rubber membrane so that it may counter with the vibrationproofing base 14. Diaphram 22 equips the periphery section with the ring-like reinforcement metallic ornaments 24, and it is attached in the 2nd fixing metal 12 by these reinforcement metallic ornaments 24 making it go away with the tubed metallic ornaments 16 and the bottom metallic ornaments 18, and caulking immobilization being carried out at the section.

[0019] Inside the 2nd fixing metal 12, the fluid enclosure room 26 sealed between diaphram 22 and the vibrationproofing base 14 is formed, and the liquid as a fluid is enclosed with this fluid enclosure room 26. the disc-like batch member 30 which has an orifice 28 at a periphery in the inner circumference of the 2nd fixing metal 12 in the fluid enclosure room 26 -- liquid -- it is attached densely. The fluid enclosure room 26 is divided into 1st room 26a by the side of a vibrationproofing base, and 2nd room 26b by the side of diaphram by this batch member 30, and both ** 26a and 26b are made open for free passage by the orifice 28.

[0020] The batch member 30 consists of disc-like rubber membrane 32 as valve portion material which divides 1st room 26a and 2nd room 26b, an orifice member 36 equipped with the slot 34 for forming an orifice 28 in a periphery, and a dashboard 38 that presses the periphery edge of the orifice member 36 to the vibrationproofing base 14 side.

[0021] The orifice member 36 is a metal or the mold Plastic solid of resin, and the slot 34 which extends over 2 rounds of upper and lower sides in a hoop direction is formed in the peripheral face. Let space surrounded by this slot 34 and thin film rubber section 14a of the

vibrationproofing base 14 be an orifice 28.
[0022] A dashboard 38 is the press-forming [redacted]t of a metal plate, and is equipped with disc-like ce[redacted] shelf 38a projected up. The dashboard 38 is attached in the 2nd fixing m[redacted]2 by periphery edge 38b making it go away with th[redacted]d metallic ornaments 16 and the bottom metallic ornaments 18, and caulking immobilization being carried out at the section.
[0023] The openings 37 and 39 for making 1st room 26a and 2nd room 26b open an orifice 28 for free passage are formed in the orifice member 36 and the dashboard 38, respectively.
[0024] The grids 40 and 42 with the circular appearance which restricts the variation rate of the vertical direction of rubber membrane 32 to a center section are formed at the orifice member 36 and the dashboard 38, respectively. Rubber membrane 32 is allotted in the clearance (hold space) 44 formed between the grid 40 of the orifice member 36 which faced 1st room 26a, and the grid 42 of the dashboard 38 facing 2nd room 26b, and the variation rate is restricted between both the grids 40 and 42. the dimension (height) of a clearance 44 is greatly set up a little rather than the thickness of rubber membrane 32 — having — **** — thereby — vertical movement of rubber membrane 32 — the variation rate is made possible.
[0025] Both the grids 40 and 42 have the same grid configuration. As shown in drawing 4 , the grid 42 prepared in central shelf 38a of a dashboard 38 consists of connection section 42b which connects between three concentric annular sections 42a prolonged in a hoop direction, and the two annular sections which prolong and adjoin radial. Connection section 42b is allotted in a pitch which is different by the inner circumference [of a grid 42], and periphery side, in the case of drawing, connection section 42b by the side of inner circumference is prepared at intervals of 90 degrees, and eight connection section 42b by the side of 4 and a periphery is prepared at intervals of 45 degrees. Moreover, both shift 22.5 degrees of phases and are prepared so that all of connection section 42b by the side of inner circumference and connection section 42b by the side of a periphery may not be in agreement. Although the through tube train which comes to arrange the through tube 46 of the shape of two or more slot is prepared in a hoop direction in this grid 42 at two trains by the side of inner circumference and a periphery, as for a through tube 46, eight pieces are prepared by the four-piece and periphery side by the inner circumference side by having changed the pitch of connection section 42b as mentioned above. Thus, by lessening the number of through tubes 46 by the inner circumference side, the opening area of each through tube 46 by the side of inner circumference is greatly securable to the same extent a periphery side. It is the same configuration as the grid 42 of the dashboard 38 which also described above the grid 40 of the orifice member 36, and both 36 and 38 are attached so that it may be allotted to the location whose mutual through tube 46 corresponded.
[0026] The protruding line 48 which encloses the periphery of each through tube 46 over the perimeter in contact with the field where the above-mentioned grids 40 and 42 counter is projected and formed in the front face of rubber membrane 32 at one. The protruding line 48 is formed in vertical both sides of rubber membrane 32 in the same configuration, as shown in drawing 3 . As shown in drawing 4 , specifically, a protruding line 48 consists of radial heights 48b prolonged in a radial corresponding to three connection sections of concentric annular heights 48a and grid 42 extend in hoop direction corresponding to annular section 42a of grid 42 42b. This radial heights 48b is prolonged covering the radial abbreviation overall length from the core of rubber membrane 32. Moreover, radial heights 48b is prepared at intervals of 22.5 degrees as appeared in all connection section 42b of a grid 42 in at least one, and so that a radial may be prolonged at an equal include angle.
[0027] As mentioned above, when a fluid flows between two-room 26a and 26b through an orifice 28 under vibration of the large amplitude with a low frequency (for example, **0.3mm or more) as it is the vibration isolator of this becoming operation gestalt, a periodic-damping function is demonstrated. Moreover, the leakage of the fluid between the through tubes 46 which adjoin a hoop direction or radial is prevented by contacting the bearing side of grids 40 and 42 where the protruding line 48 prepared in rubber membrane 32 faces. Therefore, rubber membrane 32 can be sagged every through tube 46, and a high loss factor is acquired. On the other hand, under vibration of tiny vibration width of face with a high frequency (for example, **0.1mm or less), the above-mentioned orifice 28 does not function, but the fluid pressure difference of 1st room 26a and 2nd room 26b is eased with the fluid which moves exceeding a protruding line 48, and a low dynamic spring constant is demonstrated. Thus, a high loss factor and a low dynamic spring constant can be attained abolishing an amplitude dependency as it is the vibration isolator of this operation gestalt, and sufficient engine performance can be demonstrated under different amplitude.
[0028] In addition, by radial heights 48b equally arranged in the circumference of an axis, what does not appear on the connection section of grids 40 and 42 exists by having changed the arrangement pitch of the connection section of grids 40 and 42 by the inner circumference and periphery side. However, bearing is not given to the above-mentioned engine performance in order not to bar the bending behavior for every through tube 46 of rubber membrane 32, even if it is the protruding line 48 from which it separated from grids 40 and 42 in this way.
[0029] Drawing 5 shows the example which added the configuration for positioning in the hand of cut of rubber membrane 32 to the above-mentioned operation gestalt. That is, rubber membrane 32 is equipped with the elliptical heights 50 for positioning which projects in a dashboard 38 side in this example. These heights 50 are formed in the center section of rubber membrane 32. Moreover, a dashboard 38 is equipped with the crevice 52 for positioning where the above-mentioned heights 50 fit into the core of central shelf 38a. This crevice 52 consists of a long hole corresponding to the appearance configuration of heights 50 with this operation gestalt.
[0030] In this case, radial heights 48b prepared in rubber membrane 32 can be certainly carried on connection section 42b of a grid 42 by carrying rubber membrane 32 on the grid 42 of a dashboard 38, making the crevice 52 of a dashboard 38 carry out fitting of the heights 50 of rubber membrane 32, in case rubber membrane 32 is attached on a dashboard 38.
[0031] In addition, the configuration of heights 50 and a crevice 52 is not limited to the ellipse form described above when positioning in a hand of cut was possible, but various configurations, such as the shape of a polygon, can be used for it. Moreover, the heights for positioning and every two crevices may be prepared, and you may position by 2 sets of fitting.
[0032] With the above operation gestalt, although the protruding line 48 was formed in rubber membrane 32, a protruding line may be prepared in grids 40 and 42 at one. In this case, the leakage of the fluid between the through tubes 46 which adjoin because the protruding line prepared in grids 40 and 42 contacts rubber membrane 32 is prevented.
[0033]

[Translation done.]

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3.In the drawings, any words are not translated.

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] It is drawing of longitudinal section of the vibration isolator concerning 1 operation gestalt of this invention.
[Drawing 2] It is the sectional view disassembling and showing this vibration isolator.
[Drawing 3] It is the A section enlarged drawing of drawing 2 .
[Drawing 4] (a) is a top view in the condition that the perspective view of a dashboard and (b) combined the perspective view of rubber membrane, and (c) combined a dashboard and rubber membrane.
[Drawing 5] The top view in the condition that (a) combined other dashboards and rubber membrane in an operation gestalt, and (b) are the B-B sectional view.
[Description of Notations]
10 .... The 1st fixing metal
12 .... The 2nd fixing metal
14 .... Vibrationproofing base
22 .... Diaphram
26 .... Fluid enclosure room
28 .... Orifice
30 .... Batch member
32 .... Rubber membrane
40 42 .... Grid
42a .... Annular section
42b .... Connection section
48 .... Protruding line
48a .... Annular heights
48b .... Radial heights

[Translation done.]

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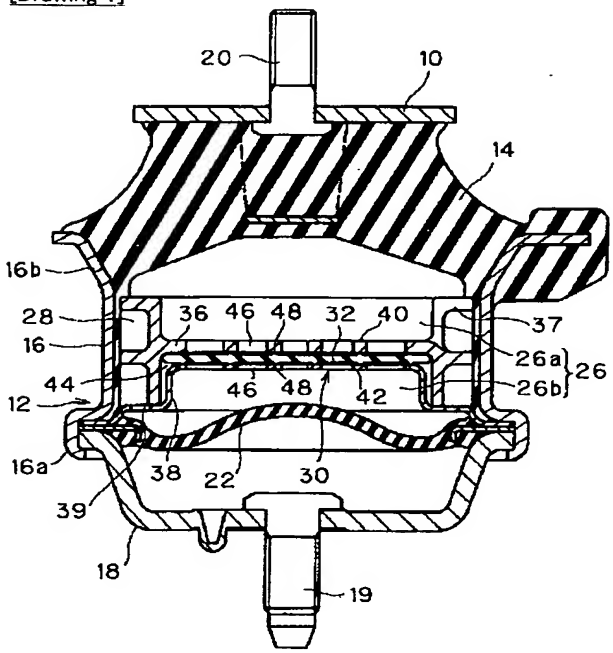
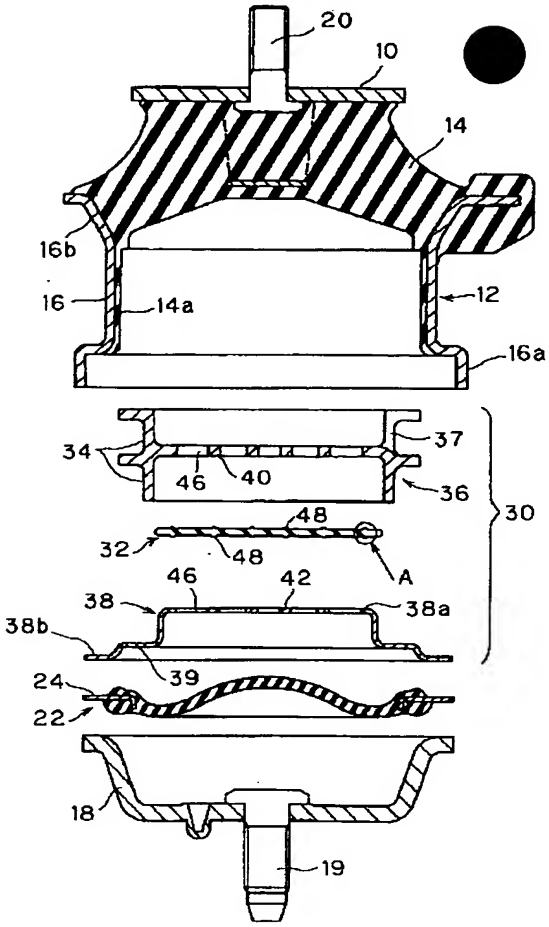
DRAWINGS

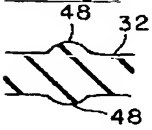
[Drawing 1]



[Drawing 2]

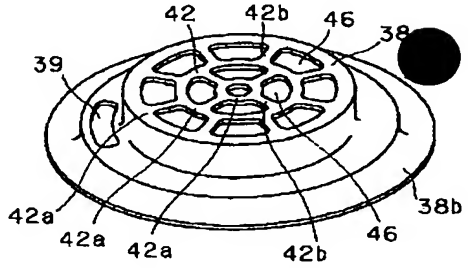


[Drawing 3]



[Drawing 4]

(a)



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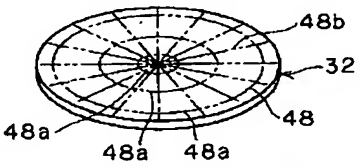

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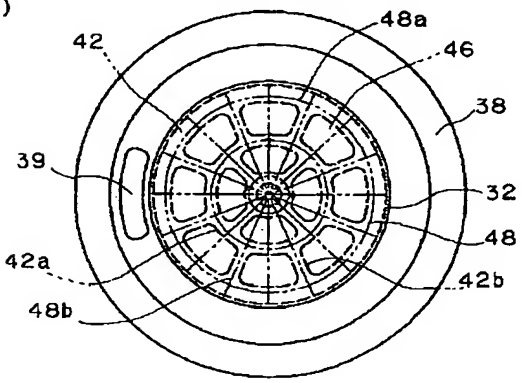
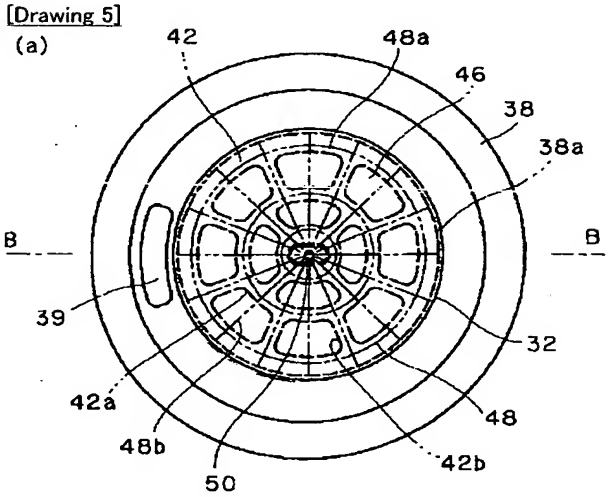
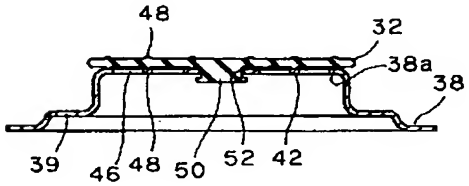


[Drawing 5]

(a)



(b)



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Ｆ１６Ｆ　13/18			６２０Ｒ	

審査請求　未請求　請求項の数４　ＯＬ　（全６頁）

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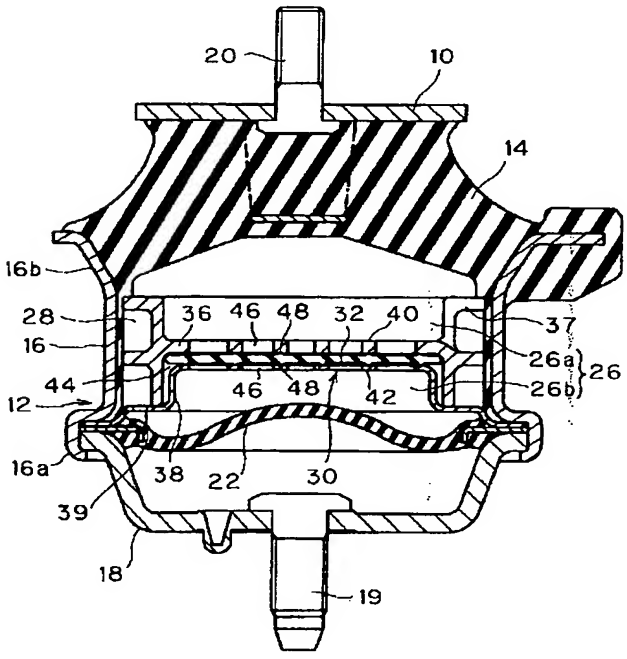
最終頁に続く

(54)【発明の名称】　流体封入式防振装置

(57)【要約】
【課題】　仕切部材の貫通孔間における封入流体の不必要なリークを防止して、防振性能を向上した防振装置を提供する。
【解決手段】　第１取付部材１０と第２取付部材１２とがゴム材よりなる防振基体１４を介して結合され、第２取付部材１２に取り付けたダイヤフラム２２と防振基体１４との間に設けられた流体封入室２６が仕切部材３０により２室に仕切られ、両室２６ａ，２６ｂがオリフィス２８で連通させた防振装置において、仕切部材３０が、両室２６ａ，２６ｂを仕切る弾性膜３２と、弾性膜３２の変位を制限する一対の格子４０，４２とを備えてなり、弾性膜３２の表面に各貫通孔４６を全周にわたって取り囲む凸条４８を一体に設け、該凸条４８を格子４０，４２に当接されることで隣接する貫通孔４６間での流体の移動を規制する。



【特許請求の範囲】

【請求項１】第１取付部材と、第２取付部材と、これら取付部材の間に介設されて両取付部材を結合するゴム材よりなる防振基体と、前記防振基体に対向させて前記第２取付部材に取り付けたダイヤフラムと、前記の防振基体とダイヤフラムとの間に設けられた流体封入室と、前記流体封入室を防振基体側の第１室とダイヤフラム側の第２室とに仕切る仕切部材と、前記の第１室と第２室を連通させるオリフィスと、を備え、

前記仕切部材が、前記の第１室と第２室を仕切る弾性膜と、該弾性膜の変位を制限する一対の格子とを備えてなり、

前記弾性膜の表面とこれに対向する前記格子の面との間に、該格子により形成される各貫通孔を全周にわたって取り囲み隣接する貫通孔間での流体の移動を規制する凸条を設けたことを特徴とする流体封入式防振装置。

【請求項２】前記凸条が、前記弾性膜の表面又はこれに対向する前記格子の面に一体に設けられたことを特徴とする請求項１記載の流体封入式防振装置。

【請求項３】前記格子が、周方向に延びる複数の環状部と、半径方向に延びて前記複数の環状部を連結する連結部とからなり、該格子により周方向に複数の貫通孔を配置してなる貫通孔列が２列以上設けられ、ここで、前記連結部は前記格子の内周側と外周側とで異なるピッチで配されており、

前記凸条が、前記弾性膜に設けられており、前記格子の前記環状部に対応して周方向に延びる複数の環状凸部と、前記格子の前記連結部に対応して放射状に延びる複数の放射状凸部とからなり、

前記放射状凸部は、前記弾性膜の半径方向の略全長にわたって、かつ、均等な角度で放射状に延びていることを特徴とする請求項１又は２記載の流体封入式防振装置。

【請求項４】前記弾性膜に位置決め用凸部を設けるとともに、前記格子に該凸部が嵌合する位置決め用凹部を設けて、両者を嵌合させることで前記弾性膜を回転方向で位置決めしたことを特徴とする請求項３記載の流体封入式防振装置。

【発明の詳細な説明】

【０００１】

【発明の属する技術分野】本発明は、主として自動車エンジン等の振動体を防振的に支承するのに用いられる流体封入式防振装置に関するものである。

【０００２】

【従来の技術】一般に、流体封入式防振装置は、エンジン等の振動発生体側に取り付けられる第１取付金具と、車体フレーム等の支持側に取付固定される筒状の第２取付金具とを、ゴム材よりなる防振基体を介して結合し、上記第２取付金具の下部側に防振基体と対向してダイヤフラムを配し、防振基体とダイヤフラムとの間の内室を流体封入室とし、この流体封入室を仕切部材により防振基体側とダイヤフラム側との２室に仕切り、両室をオリフィスにより連通せしめてなり、オリフィスによる両液室間の液流動効果や防振基体の制振効果により、振動減衰機能を果たすように構成されている。

【０００３】かかる流体封入式防振装置において、仕切部材を、往復動変位する弁部材としての弾性膜と、該弾性膜の動きを制限する上下一対の格子とで構成したものが公知である。このような弾性膜を持つ防振装置は、車両走行時の路面の凹凸に起因する振動のような周波数の低い大振幅の振動下では、流体がオリフィスを通って２室間を流動することで振動減衰機能を発揮する。一方、エンジンの回転数に起因する振動のような周波数の高い微振幅の振動下では、上記オリフィスは機能せず、弾性膜の往復動変形により振動減衰機能を発揮する。

【０００４】フランス国特許公開第２６７４５９０号公報には、上下の液室を仕切る仕切部材として、上下一対の格子と、該格子間に保持された弾性膜とで構成したものが開示されている。同公報では、弾性膜は、その中央部が上下の格子間に挟持され、縁部が浮動するように設けられており、弾性膜と格子との衝突音や望ましくない騒音の発生を防止するため、弾性膜の少なくとも一方の面には格子に対向する円形突起が設けられている。この円形突起は、弾性膜の表面にリング状に並んだ状態で均等に配置されており、弾性膜の作動時に、格子に段階的に押圧され次いで弾性的に弛緩する機能を持っている。

【０００５】また、特開平６－２２１３６８号公報には、上記と同様に弾性膜と格子との衝突音や望ましくない騒音の発生を防止するため、弾性膜ではなく格子に、角度的には順次であるが、軸線の回り全体にわたって角度的に繰り返しのない不均等性のリブを設ける技術が開示されている。

【０００６】

【発明が解決しようとする課題】上記従来技術の円形突起やリブは、弾性膜が上下に変位することで格子に衝突する際の衝撃音を軽減するために設けられたものであり、格子により形成される貫通孔間において、周方向や半径方向での封入液の移動を制限するものではない。そのため、上記従来の防振装置では、周波数の低い大振幅の振動下において、隣接する貫通孔間で封入液の移動（リーク）が起こり、より高い性能を発揮し難い。

【０００７】本発明は、このような点に鑑みてなされたものであり、仕切部材の貫通孔間における封入流体の不必要なリークを防止して、防振性能を向上することを目的とする。

【０００８】

【課題を解決するための手段】本発明の流体封入式防振装置は、第１取付部材と、第２取付部材と、これら取付部材の間に介設されて両取付部材を結合するゴム材よりなる防振基体と、前記防振基体に対向させて前記第２取付部材に取り付けたダイヤフラムと、前記の防振基体と

ダイヤフラムとの間に設けられた流体封入室と、前記流体封入室を防振基体側の第１室とダイヤフラム側の第２室とに仕切る仕切部材と、前記の第１室と第２室を連通させるオリフィスと、を備え、前記仕切部材が、前記の第１室と第２室を仕切る弾性膜と、該弾性膜の変位を制限する一対の格子とを備えてなり、前記弾性膜の表面とこれに対向する前記格子の面との間に、該格子により形成される各貫通孔を全周にわたって取り囲み隣接する貫通孔間での流体の移動を規制する凸条を設けたものである。

【０００９】本発明の流体封入式防振装置では、弾性膜とこれに対向する格子との間に各貫通孔を全周にわたって取り囲む凸条を設けたことにより、特に周波数の低い大振幅の振動下において上記凸条が隣接する貫通孔間での流体の漏れを防止する。そのため、弾性膜を各貫通孔ごとに撓ませることができ、高いロスファクターが得られる。また、周波数の高い微振幅の振動下では、流体が上記凸条を越えて移動するようにしてもよく、その場合、凸条を越えて移動する流体が液圧差を緩和して低動ばね定数を発揮する。

【００１０】上記凸条は、弾性膜の表面又はこれに対向する格子の面に一体に設けることができる。

【００１１】より具体的には、前記格子が、周方向に延びる複数の環状部と、半径方向に延びて前記複数の環状部を連結する連結部とからなり、該格子により周方向に複数の貫通孔を配置してなる貫通孔列が２列以上設けられ、ここで、前記連結部は前記格子の内周側と外周側とで異なるピッチで配されており、前記凸条が、前記弾性膜に設けられており、前記格子の前記環状部に対応して周方向に延びる複数の環状凸部と、前記格子の前記連結部に対応して放射状に延びる複数の放射状凸部とからなり、前記放射状凸部は、前記弾性膜の半径方向の略全長にわたって、かつ、均等な角度で放射状に延びている場合がある。この場合、放射状凸部の中には格子の連結部上に載らないものもあるが、このように格子から外れた凸条であっても弾性膜の各貫通孔ごとの撓み挙動を妨げることはない。そのため、弾性膜の軸線回りで均等に配置した凸条でも機能に支障を与えない。

【００１２】弾性膜に上記凸条を設ける場合、弾性膜に位置決め用凸部を設けるとともに、前記格子に該凸部が嵌合する位置決め用凹部を設けて、両者を嵌合させることで前記弾性膜を回転方向で位置決めしてもよい。これにより、弾性膜に設けた放射状凸部を格子の連結部上に確実に載せることができる。

【００１３】

【発明の実施の形態】以下、本発明の実施形態を図面を参照して説明する。

【００１４】図１は本発明の１実施形態に係る流体封入式防振装置の縦断面図、図２はその分解図である。この防振装置は、エンジン等の振動発生体側に取り付けられる第１取付金具１０と、車体フレーム等の支持側に取付固定される筒状の第２取付金具１２とを、ゴム材よりなる防振基体１４を介して結合してなる。

【００１５】第２取付金具１２は、筒状金具１６と、その下端１６ａにかしめ手段により締結された底金具１８とからなり、底金具１８に取付用ボルト１９が突設されている。

【００１６】第１取付金具１０は、第２取付金具１２の軸心部上方に所要の間隔をおいて配された板状部材であり、その中央部に取付用ボルト２０が上方に向けて突設されている。

【００１７】防振基体１４は、外形が略截頭円錐形をなし、その上面に第１取付金具１０が加硫成形手段により固着され、下端外周部に第２取付金具１２の上端部が加硫成形手段により固着されている。図の場合、筒状金具１６の上端部１６ｂがテーパ状に拡径形成されており、該上端部１６ｂに防振基体１４の下部外周が加硫接着されている。第２取付金具１２の内壁面には、防振基体１４から薄膜状に延設された薄膜ゴム部１４ａが設けられている。

【００１８】第２取付金具１２の下部側には、防振基体１４と対向するようにゴム膜よりなるダイヤフラム２２が装着されている。ダイヤフラム２２は、外周部にリング状の補強金具２４を備え、この補強金具２４が筒状金具１６と底金具１８とのかしめ部にかしめ固定されることで第２取付金具１２に取り付けられている。

【００１９】第２取付金具１２の内側には、ダイヤフラム２２と防振基体１４との間に密閉された流体封入室２６が形成されており、この流体封入室２６に流体としての液体が封入されている。流体封入室２６における第２取付金具１２の内周には、外周にオリフィス２８を有する円盤状の仕切部材３０が液密に嵌着されている。流体封入室２６は、この仕切部材３０により防振基体側の第１室２６ａとダイヤフラム側の第２室２６ｂとに仕切られており、両室２６ａ，２６ｂがオリフィス２８により連通せしめられている。

【００２０】仕切部材３０は、第１室２６ａと第２室２６ｂとを仕切る弁部材としての円板状のゴム膜３２と、外周にオリフィス２８を形成するための溝３４を備えるオリフィス部材３６と、オリフィス部材３６の外周縁部を防振基体１４側に押圧する仕切板３８とで構成されている。

【００２１】オリフィス部材３６は、金属又は樹脂のモールド成形体であって、外周面には周方向に上下２周にわたって延びる溝３４が形成されている。この溝３４と防振基体１４の薄膜ゴム部１４ａとで囲まれた空間がオリフィス２８とされている。

【００２２】仕切板３８は、金属板のプレス成形体であって、上方に突出した円板状の中央棚部３８ａを備える。仕切板３８は、外周縁部３８ｂが筒状金具１６と底

金具１８とのかしめ部にかしめ固定されることで第２取付金具１２に取り付けられている。

【００２３】オリフィス部材３６と仕切板３８には、オリフィス２８を第１室２６ａと第２室２６ｂに連通させるための開口３７，３９がそれぞれ設けられている。

【００２４】オリフィス部材３６と仕切板３８にはそれぞれ中央部に、ゴム膜３２の上下方向の変位を制限する外形が円形の格子４０，４２が設けられている。ゴム膜３２は、第１室２６ａに面したオリフィス部材３６の格子４０と第２室２６ｂに面した仕切板３８の格子４２との間で形成される隙間（収容空間）４４内に配されて、両格子４０，４２間でその変位が制限される。隙間４４の寸法（高さ）は、ゴム膜３２の厚みよりも若干大きく設定されており、これにより、ゴム膜３２の上下動変位を可能にしている。

【００２５】両格子４０，４２は同一の格子形状を持っている。図４に示すように、仕切板３８の中央棚部３８ａに設けられた格子４２は、周方向に延びる３本の同心状の環状部４２ａと、半径方向に延びて隣接する２つの環状部間を連結する連結部４２ｂとからなる。連結部４２ｂは、格子４２の内周側と外周側とで異なるピッチで配されており、図の場合、内周側の連結部４２ｂは９０°間隔で４本、外周側の連結部４２ｂは４５°間隔で８本設けられている。また、内周側の連結部４２ｂと外周側の連結部４２ｂとが全て一致しないように、両者は位相を２２．５°ずらして設けられている。この格子４２により、周方向に複数の長穴状の貫通孔４６を配置してなる貫通孔列が内周側と外周側との２列に設けられるが、上記のように連結部４２ｂのピッチを変えたことにより、貫通孔４６は内周側で４個、外周側で８個が設けられる。このように内周側で貫通孔４６の数を少なくすることで、内周側の各貫通孔４６の開口面積を、外周側と同程度に、大きく確保することができる。オリフィス部材３６の格子４０も上記した仕切板３８の格子４２と同一形状であり、かつ、両者３６，３８は互いの貫通孔４６が一致した位置に配されるように組付けられる。

【００２６】ゴム膜３２の表面には、上記格子４０，４２の対向する面に当接して各貫通孔４６の外周を全周にわたって取り囲む凸条４８が一体に突出形成されている。凸条４８は、図３に示すように、ゴム膜３２の上下両面に同一形状にて設けられている。具体的には、図４に示すように、凸条４８は、格子４２の環状部４２ａに対応して周方向に延びる３本の同心状の環状凸部４８ａと、格子４２の連結部４２ｂに対応して放射状に延びる放射状凸部４８ｂとからなる。この放射状凸部４８ｂは、ゴム膜３２の中心から半径方向の略全長にわたって延びている。また、放射状凸部４８ｂは、格子４２の全ての連結部４２ｂに少なくとも１本が載るように、かつ、均等な角度で放射状の延びるように、２２．５°間隔で設けられている。

【００２７】以上よりなる本実施形態の防振装置であると、周波数の低い大振幅（例えば±０．３mm以上）の振動下では、流体がオリフィス２８を通って２室２６ａ，２６ｂ間を流動することにより振動減衰機能が発揮される。また、ゴム膜３２に設けた凸条４８が相対する格子４０，４２の支承面に当接することにより、周方向又は半径方向に隣接する貫通孔４６間での流体の漏れが防止される。そのため、ゴム膜３２を各貫通孔４６ごとに撓ませることができ、高いロスファクターが得られる。一方、周波数の高い微振幅（例えば±０．１mm以下）の振動下では、上記オリフィス２８は機能せず、凸条４８を越えて移動する流体により第１室２６ａと第２室２６ｂとの液圧差が緩和されて低動ばね定数が発揮される。このように本実施形態の防振装置であると、振幅依存性をなくしつつ高いロスファクターと低動ばね定数を達成することができ、異なる振幅下において十分な性能を発揮させることができる。

【００２８】なお、格子４０，４２の連結部の配設ピッチを内周側と外周側で変えたことにより、軸線回りに均等に配設した放射状凸部４８ｂでは、格子４０，４２の連結部上に載らないものも存在する。但し、このように格子４０，４２から外れた凸条４８であってもゴム膜３２の各貫通孔４６ごとの撓み挙動を妨げることはないため、上記した性能に支承を与えない。

【００２９】図５は、上記実施形態にゴム膜３２の回転方向での位置決めのための構成を追加した例を示したものである。すなわち、この例では、ゴム膜３２は、仕切板３８側に突出する楕円形状の位置決め用凸部５０を備える。該凸部５０はゴム膜３２の中央部に設けられている。また、仕切板３８は、中央棚部３８ａの中心に上記凸部５０が嵌合する位置決め用凹部５２を備える。該凹部５２は、この実施形態では凸部５０の外形形状に対応する長孔からなる。

【００３０】この場合、ゴム膜３２を仕切板３８上に組付ける際に、ゴム膜３２の凸部５０を仕切板３８の凹部５２に嵌合させながら、ゴム膜３２を仕切板３８の格子４２上に載せることにより、ゴム膜３２に設けた放射状凸部４８ｂを格子４２の連結部４２ｂ上に確実に載せることができる。

【００３１】なお、凸部５０及び凹部５２の形状は、回転方向での位置決めが可能であれば上記した楕円形には限定されず、多角形状など種々の形状を採用することができる。また、位置決め用凸部と凹部を２つずつ設けて２組の嵌合により位置決めしてもよい。

【００３２】以上の実施形態では、ゴム膜３２に凸条４８を設けたが、凸条は格子４０，４２に一体に設けてもよい。この場合、格子４０，４２に設けた凸条がゴム膜３２に当接することで隣接する貫通孔４６間での流体の漏れが防止される。

【００３３】

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【発明の効果】本発明の流体封入式防振装置であると、弾性膜とこれに対向する格子との間に各貫通孔を全周にわたって取り囲む凸条を設けたことにより、特に周波数の低い大振幅の振動下において隣接する貫通孔間での流体の漏れを防止することでき、防振性能を向上することができる。

【図面の簡単な説明】

【図１】本発明の１実施形態に係る防振装置の縦断面図である。

【図２】同防振装置を分解して示す断面図である。

【図３】図２のＡ部拡大図である。

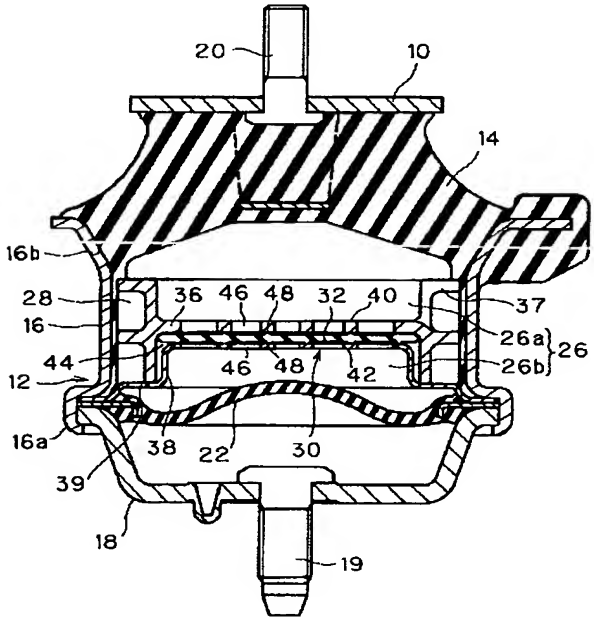
【図４】（ａ）は仕切板の斜視図、（ｂ）はゴム膜の斜視図、（ｃ）は仕切板とゴム膜を組み合わせた状態での平面図である。

【図５】（ａ）は他の実施形態における仕切板とゴム膜を組み合わせた状態での平面図、（ｂ）はそのＢ－Ｂ断面図である。

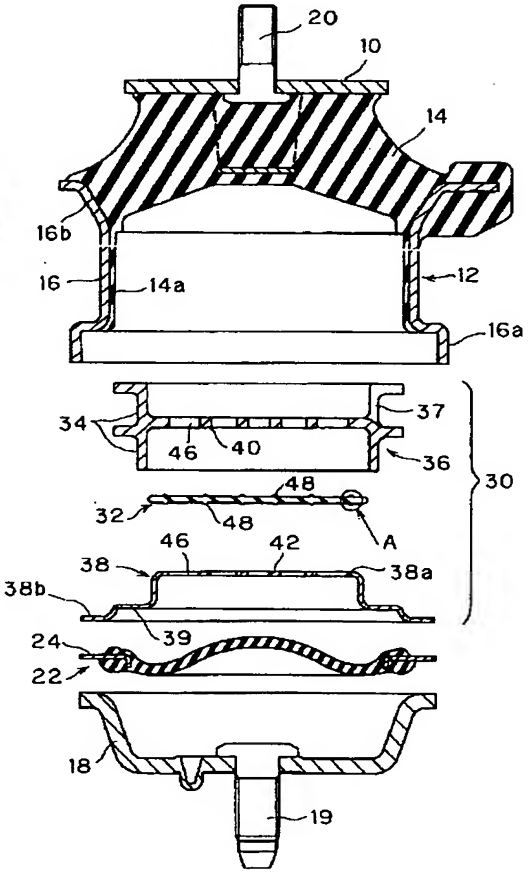
【符号の説明】

１０……第１取付金具
１２……第２取付金具
１４……防振基体
２２……ダイヤフラム
２６……流体封入室
２８……オリフィス
３０……仕切部材
３２……ゴム膜
４０，４２……格子
４２ａ……環状部
４２ｂ……連結部
４８……凸条
４８ａ……環状凸部
４８ｂ……放射状凸部

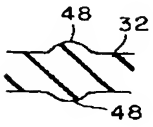
【図１】



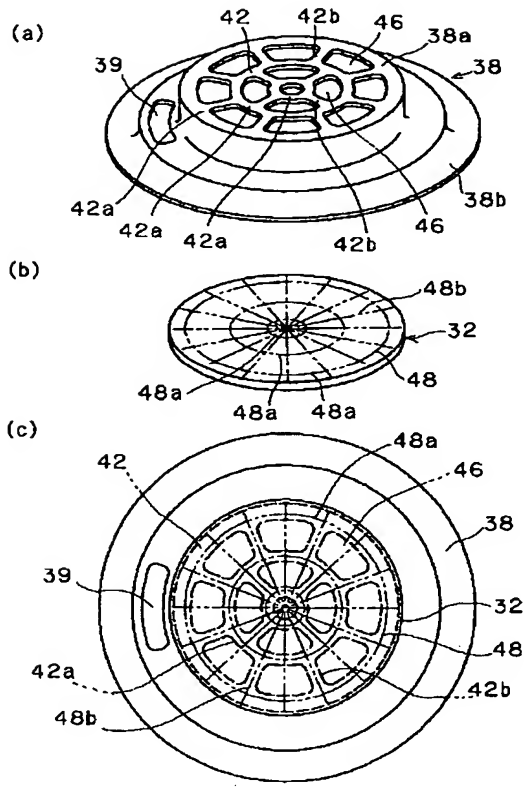
【図２】



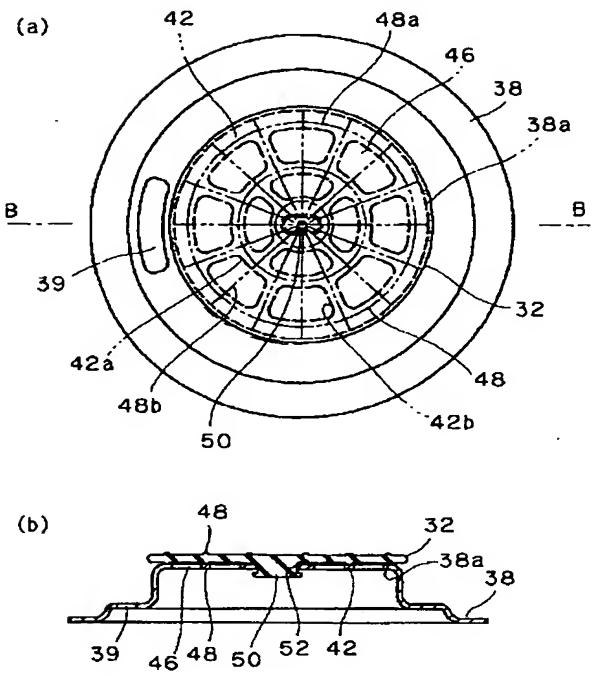
【図３】



【図４】



【図５】



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